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Non Parametric Stability Analysis for Yield of Hybrid Chili Pepper (*Capsicum annuum* L.) Across Six Different Environments

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ABSTRACT

The objectives of this study were to evaluate several chili pepper hybrids whith high yielding character and stable at six environments based on some non-parametric stability analyses, and to study the correlation among the stability of non-parametric methods. The hybrid of chili pepper (7 candidates varieties and 5 commercial hybrid cultivars) were grown in a randomized complete block design with 3 replications in 6 different environments. Ten nonparametric stability methods were used to identify the stable genotypes. According to the $SI^{(3)}$, RS, $NPi^{(1)}$, $NPi^{(2)}$, $NPi^{(3)}$ and $NPi^{(4)}$ stability parameters, Imperial was the most stable hybrid. According to the $SI^{(1)}$, $SI^{(2)}$ and TOP stability parameters and yield, IPB CH3 was the most stable hybrid. In this study, the high TOP values were associated with the yield. Nonetheless, the results of the other non parametric ($SI^{(6)}$, $NPi^{(3)}$ and $NPi^{(4)}$) were negatively correlated to the yield. The results also revealed that based on the non parametric stability test, the results could be classified into 2 groups, according to the agronomic and biological stabilities.

Keywords: chili pepper, environment, non-parametric stability, yield

ABSTRAK

Penelitian ini bertujuan untuk mengevaluasi stabilitas hasil berbagai hibrida cabai yang berdaya hasil tinggi di enam lingkungan berdasarkan analisis stabilitas non parametric, dan mempelajari korelasi antar metode stabilitas non parametrik. Dua belas hibrida cabai (7 kandidat varietas dan 5 varietas komersial) ditanam dengan rancangan kelompok lengkap teracak menggunakan tiga ulangan pada enam lingkungan berbeda. Sepuluh metode stabilitas non parametrik digunakan untuk mengidentifikasi genotipe yang stabil. Menurut parameter stabiltas $SI^{(3)}$, RS, $NPi^{(1)}$, $NPi^{(2)}$, $NPi^{(3)}$ dan $NPi^{(4)}$, hibrida yang paling stabil adalah Imperial. Menurut parameter stabilitas $SI^{(1)}$, $SI^{(2)}$, TOP dan hasil, IPB CH3 adalah hibrida yang paling stabil. Pada penelitian ini, nilai TOP yang tinggi berhubungan dengan hasil. Namun demikian, parameter stabilitas $SI^{(6)}$, $NPi^{(3)}$ dan $NPi^{(4)}$ berkorelasi negatif terhadap hasil. Hasil penelitian juga mengungkapkan bahwa berdasarkan analisis stabilitas non parametrik, hibrida-hibrida yang diuji diklasifikasikan menjadi 2 kelompok yaitu stabil agronomis (dinamis) dan stabil biologis (statis).

Kata kunci: cabai, hasil, lingkungan, stabilitas non parametrik

INTRODUCTION

Chili pepper is one of the essential commodities and vegetables with a high economic value in Indonesia. This plant is well developed in the lowlands as well as in the highlands. According to Badan Pusat Statistik (2011), the productivity of the national chili pepper Indonesia in 2010 was 5.6 ton ha^{-1}. However, the productivity of chili peper is still very low compared to its production potential. According to Syukur *et al*. (2010) the potential produktivity of national chili may reach 22 ton ha^{-1}.

To meet the high demand, various efforts for improving the productivity of chili pepper is needed. Seed quality of improved cultivars are one of the factors that influence the success of the production in agriculture. One alternative to increase chili pepper productivity is cultivar improvement, including hybrid cultivars. The productivity of hybrid cultivars is higher than the open pollinated variety (OPV). Improved results of chili pepper hybrids can achieve 61% higher than that of their parents (Syukur *et al*., 2012).

The plant breeding aims to improve the character of the plant in accordance to human needs by utilizing the potential of the genotype and genotype x environment interaction (GEI). Genotype x environment interaction can be used by plant breeders to develop new high yielding cultivars of specific environments or widely adapted cultivars. If genotype x environment interaction is high, then it is need to develop the cultivars of the specific location, on the

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